More problems for section 2.4 of *Essentials of Precalculus with Calculus Previews* by Zill and Dewar, 5e.

1. Rewrite the quadratic function $ax^2 + bx + c$ in standard form $a(x - h)^2 + k$. Find its real zeros and the vertex of its graph.

a. $x^2 + 4x - 3$ b. $x^2 + 6x + 17$ c. $x^2 - 8x + 18$ d. $x^2 - 6x + 5$

e. $x^2 - 4x - 5$ f. $x^2 + x - 1$ g. $x^2 + 3x + 5$ h. $2x^2 + 4x - 5$

i. $3x^2 - 12x + 8$ j. $-2x^2 + 20x - 32$ k. $5x^2 + 40x + 83$ l. $9 - 6x - x^2$

m. $8 + 6x - 2x^2$ n. $16x - 2x^2 - 22$

Answers

1a. $(x+2)^2 - 7$, $x = -2 \pm \sqrt{7}$, vertex: $(-2, -7)$. 1b. $(x+3)^2 + 8$, no real zeros, vertex: $(-3, 8)$. 1c. $(x-4)^2 + 2$, no real zeros, vertex: $(4, 2)$. 1d. $(x-3)^2 - 4$, $x = 1, 5$, vertex: $(3, -4)$. 1e. $(x-2)^2 - 9$, $x = -1, 5$, vertex: $(2, -9)$. 1f. $(x + \frac{1}{2})^2 - \frac{5}{4}$, $x = -\frac{1}{2} \pm \frac{\sqrt{5}}{2}$, vertex: $(-\frac{1}{2}, -\frac{5}{4})$. 1g. $(x+\frac{3}{2})^2+\frac{11}{4}$, no real zeros, vertex: $(-\frac{3}{2}, \frac{11}{4})$. 1h. $2(x+1)^2-7$, $x = -1 \pm \sqrt{\frac{7}{2}}$, vertex: $(-1, -7)$. 1i. $3(x-2)^2-4$, $x = 2 \pm \frac{2}{\sqrt{3}}$, vertex: $(2, -4)$. 1j. $-2(x-5)^2+18$, $x = 2, 8$, vertex: $(5, 18)$. 1k. $5(x+4)^2+3$, no real zeros, vertex: $(-4, 3)$. 1l. $-(x+3)^2+18$, $x = -3 \pm 3\sqrt{2}$, vertex: $(-3, 18)$. 1m. $-2(x-\frac{3}{2})^2+\frac{25}{2}$, $x = -1, 4$, vertex: $(\frac{3}{2}, \frac{25}{2})$. 1n. $-2(x-4)^2+10$, $x = 4 \pm \sqrt{5}$, vertex: $(4, 10)$.